

APPENDIX E

FREMONT COTTONWOOD LIFE HISTORY PARAMETERS

Life History/Ecological Property Fremont Cottonwoods (<i>Populus fremontii</i>)		Reference(s)
Reproduction		
Flowering Time	February-March	Braatne et al, 1998
Seed Dispersal Time	March-April (general)	Braatne et al, 1998
	February- April (Arizona)	Shafroth, et. al, 1998
	May-July (Sacramento River)	CALFED, 1999
	April- May	Taylor, 2002
	Mid-April-mid-June (Sacramento River "recruitment period")	Roberts et. al, 2002
Seed Dispersal Agent	Air and water	Braatne et al, 1998
Seed Dispersal Distance	Predominantly within a few hundred meters	Braatne et al, 1998
Asexual traits	Suckering	Braatne et al, 1998; Borman and Larson, 2002
Germination/Establishment		
Seed Viability (natural conditions)	Dry: 1- 3 weeks	Braatne et al, 1998
	Dry: 1-2 weeks	Borman and Larson, 2002
	Wet: 1-2 days	Braatne et al, 1998; Borman and Larson, 2002
Seed Germination	24 hours/bare ground	Braatne et al, 1998
Seedling Root Growth Rate	4-12 millimeters/day; higher rates in fine silty sands than coarse gravel	Braatne et al, 1998
	22-32 mm/day (Sacramento River)	Roberts et. al, 2002
Ramping Rate ¹ associated with cottonwood recruitment	2.5 – 5 centimeters/day (Sacramento River)	Mahoney and Rood, 1992
	1-1.3 inches/day (2.5 – 3.25 centimeters/day)	Roberts et. al, 2002
	Find sediments can handle a higher ramping rate than coarse gravels.	CALFED, 1999
Inundation tolerance	8 days still alive, 16 days died	Borman and Larson, 2002
Drought tolerance	Low to None	Borman and Larson, 2002
Dormant Season	Not specified	
Growth		
Rooting Depth of Saplings, first growing season	75-150 centimeters possible	Braatne et al, 1998
Shade tolerance	Low	Merigliano, 1996
Inundation tolerance	3-4 weeks	Braatne et al, 1998
	Low tolerance; can survive	Borman and Larson, 2002

¹ Water level decline rate. Also called "water recession rate."

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	using anaerobic respiration and other techniques for a short time; stress usually seen within a few weeks	
Inundation & drought Vulnerability	Until roots reach alluvial water tables, 2+ meters	Braatne et al, 1998
Scouring tolerance	Little to none	Braatne et al, 1998
Tree height during Sapling Development	5-50 centimeters @ 2-3 years	Braatne et al, 1998
Dormant Season	Not specified	
Maturation		
Age at Reproductive Maturity	7+ years; flowering occurs	Rood and Mahoney, 1990
Rooting Depth of Mature Stands	3-5 meters	Braatne et al, 1998
Lifespan	130+ years	Braatne et al, 1998
Tree Height at Reproductive Maturity	10-15 meters	Braatne et al, 1998
Tree Height	6-34 meters	Taylor, 2000
Tree Diameter at Breast Height	0.5 – 3.9 meters	Taylor, 2000
Mature Stand Density	50-400+/hectare	Braatne et al, 1998
Drought tolerance	Moderate	
Recruitment Microsite Properties		
Elevation above water table ²	1-2 meters above baseflow (Sacramento River)	CALFED, 1999
	5.5-9 feet (2-3 meters) above mean low water (Sacramento River)	Roberts et. al, 2002
	3.3 – 8.2 feet (1-3 meters) above mean low water	Various studies cited in Roberts et. al, 2002
Soil	Bare ground, free of litter, Moist, exposed substrates	Braatne et al, 1998
Light	Full sunlight required	Braatne et al, 1998
“Safe Site” Qualities	Free of herbivory	Borman and Larson, 2002
	Free of competition	Borman and Larson, 2002
	Protected from scouring energy due to flooding ³	CALFED, 1999
Rosgen Stream Classifications	Usually C and low-gradient B channels; stream gradient 2%	Borman and Larson, 2002
Soil pH	6.0 to 7.0	Borman and Larson, 2002
Soil Salinity	0-1500 milligrams/liter	Braatne et al, 1998

² Elevation seems to change with river size. Larger rivers tend to show greater distances to water table (Roberts et. al., 2002)

³ Sites protected by flood scour, such as meander cutoffs, and sites with low shear stress, such as point bars opposite an actively eroding (retreating) bank (CALFED, 1999).

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Other Causes of Mortality		
Competing Land Uses	Mowing, development	
Herbivory	Beaver, Livestock	